

Notice of Allowability

Application No.

10/625,801

Examiner

Alan Diamond

Applicant(s)

ZUPPERO ET AL.

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1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the terminal disclaimers filed 04/20/2006.
2. ☒ The allowed claim(s) is/are 32,34,35,39,40,43,44,46,48,52-54,57-63,65,67-72,74-77,79,81-89 and 93-102.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 02062006,02142006
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

REASONS FOR ALLOWANCE

1. The following is an examiner's statement of reasons for allowance: The prior art does not teach or suggest the instant method of producing electrical energy, comprising the instant forming steps, and the instant conveying, initiating, and removing steps, wherein the one or more highly vibrationally excited reaction products transfer reaction product energy to electrons in the thin electrically conducting surface, which electrons become energetic, travel into the one or more semiconductor elements and produce electricity.

In Nienhaus et al, "Direct detection of electron-hole pairs generated by chemical reactions on metal surfaces," Surface Science, Vol. 445, (2000) pages 335-342, gas particles adsorb on a metal surface creating electron-hole (e-h) pairs, and hot electrons then travel ballistically through the metal film into a semiconductor where they are detected (see Figure 1). In copending application Serial No. 10/052,004, in the reply by Applicant filed 06/06/2005 of said copending application, Applicant notes that "Nienhaus et al creates adsorbates, not highly vibrationally excited molecules." Applicant also notes in said reply in 10/052,004, that chemicurrent arises in Nienhaus et al when the energy of reactants form an adsorbate on the surface of a semiconductor. Nienhaus et al is already of record in the instant application. Nienhaus et al does discuss adsorbate vibrational damping (see page 335). In any event, even if Nienhaus et al's adsorbed gas is highly vibrationally excited, the limitations of the instant claims are still not met since Nienhaus et al does not convey "reactants" onto its surface, but rather conveys a single adsorbing species, i.e., the hydrogen or oxygen, onto the surface. Even if a

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skilled artisan was to simultaneously provide hydrogen and oxygen for adsorption, the limitations of instant claim 32 would still not be met because this claim also requires removing one or more products of the chemical reaction from the region by gas convection. In Nienhaus et al, the product of the reaction is the adsorbed hydrogen or oxygen, and this product is not removed by convection. Exhaust would be removed by Nienhaus et al. If the adsorbed product is de-adsorbed, then this is the reverse reaction, and the product, i.e., the de-adsorbed gas, is not the product that has the vibrational energy for transfer to electrons in the conducting surface. Looking to the instant specification, none of the chemical reactions described at page 6, line 19, through page 7, line 19, is a simple gas adsorption as in Nienhaus et al, but rather involves, for example, fuel-oxidizer reaction.

Hunter (U.S. 6,027,954) and Gergen et al "Chemically Induced Electronic Excitations at Metal Surfaces", Science, Vol. 294, pages 2521-2523, December 21, 2001, are similar to Nienhaus et al and do not anticipate or render obvious the claimed invention for the same reasons described above for Nienhaus et al. Gergen et al can not even be used as prior art due to its December 21, 2001 publication date. The instant claims are fully supported by provisional application 60/290,058, which has a filing date of May 10, 2001.

Zuppero et al (U.S. 6,114,620) lacks the instant forming step, wherein the thin electrically conducting surface and the one or more semiconductor elements form a semiconductor diode. In Zuppero et al's Figure 1, the diodes have reference signs (109) and (113), and neither the catalyst (105) nor the interlayer (106) is part of the

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diode. Indeed, said Figure 1 shows a non-conducting layer (107) between the diode (109) and the interlayer (106). Zuppero et al is already of record in the instant application.

In Zuppero et al (WO 01/28677), figure 6 is most pertinent and shows a diode formed from thin metal underlayer electrode (605) and semiconductor (604). However, in Zuppero et al '677 it is the reactants, not, per se, the reaction products that have the vibrational energy that is transferred to electrons in said layer (605) (see page 25, lines 19-23; and page 28, lines 3-9). Zuppero et al '677 teaches that "[e]xcess reaction energy may produce a burst of hot electrons which travel through the thin catalyst structure ensemble 607 and causes products to be formed." There is no teaching or suggestion in Zuppero et al '677 that such excess reaction energy should be from vibrationally excited reaction products. Zuppero et al '677 is already of record in the instant application.

In any event, with respect to both Zuppero et al and Zuppero et al '677, the instant claims are fully supported by provisional application 60/290,058, which has a filing date of 05/10/2001. Both Zuppero et al and Zuppero et al '677 have the same inventive entity as the instant application, but did not publish more than one year prior to 05/10/2001.

Neither Few et al (U.S. 5,404,712) nor Lee (U.S. 3,925,235) leads a skilled artisan to the claimed method.

McFarland et al (U.S. Patent 6,903,433) is pertinent and teaches chemical reactions of, for example, $\text{CO} + \text{O}_2$, $\text{CO} + \text{NO}$, or $\text{H}_2 + \text{O}_2$ on a Schottky diode surface (see

col. 10, lines 22-39). However, McFarland et al cannot be used as prior art due to the fact that its earliest date is July 11, 2002. The instant application goes back to May 10, 2002, and even back to May 10, 2001.

The terminal disclaimers filed 04/20/2006 have been approved. Accordingly, all obviousness-type and provisional obviousness-type double patenting rejections are now moot.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond
Primary Examiner
Art Unit 1753

Alan Diamond
May 2, 2006

A handwritten signature in black ink, appearing to read 'Alan Diamond', with a stylized flourish at the end.